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East Europe Report

SCIENTIFIC AFFAIRS

No. 722

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BRIEFS

FIELD MICE ENDANGERING CROPS--An unusual population explosion of field mice in Central Bohemian Kraj, South Moravian Kraj, North Moravian Kraj and West Slovakian Kraj in 1981 has endangered agricultural cultivations, literally liquidating fields of alfalfa, clover, rape, caraway seed and even damaging fruit trees in front of cultivators' eyes. Currently endangered are 6,000 hectares of agricultural fields in Prostejov District and 5,000 hectares in Vyskov District, as well as other areas in the South Moravian Kraj totalling 30,000 hectares. Replacement for rodenticide Endrin is being sought since Endrin destroys other fauna as well. Rodenticide Stutox has not been a favorite with agriculturists because of its high price; treatment of 1 hectare of fields with Stutox costs Kcs 210 compared with Kcs 18 for Endrin. [Prague SVOBODNE SLOVO in Czech 3 Nov 81 p 3]

CSO: 2402/5

GERMAN DEMOCRATIC REPUBLIC

USE OF LASER TECHNOLOGY IN SHIPBUILDING DETAILED

East Berlin SEEWIRTSCHAFT in German Vol 13 No 8, Aug 81 pp 400-403

[Article by Guenter K. Herz, VEB People's Shipyard, Stralsund; Technological Research and Rationalization of Shipbuilding: "Use of Laser Technology for Positioning in the Assembly of Ship Hulls at the VEB People's Shipyard, Stralsund"]

[Text] Positioning Tasks in the Final Assembly Process of Ships

1.1 The State of Ship Assembly Operations

Ships--like the majority of all the products of the metalworking industry--are composite structures. Assembly operations are necessary for their manufacture. The amount of time and money spent on assembly operations is considerable. Woithe [1] calculates that assembly operations on the average amount to 40-50 percent of the total manufacturing cost in machine construction in the GDR, and this figure is increasing. Maier and Rogge [2] show that 33 percent of the total manufacturing costs for ships must be spent on hull construction, and assembly operations account for 86 percent of hull construction. At the VEB People's Shipyard in Stralsund this amount was 81.3 percent in 1979.

The particular significance of these operations derives not only from their scope but also from the fact that the level of applied technology in assembly is still relatively low. The preeminence of mechanization and automation in the manufacture of parts and substructures leads to an absolute and relative increase in the number of predominantly manual workers.

From the definitions

$$\text{Degree of mechanization} = \frac{\text{Production staff employed on machinery and equipment}}{\text{Total production staff}}$$

$$\text{Degree of automation} = \frac{\text{Production staff employed on machinery and equipment with checking and supervisory responsibilities}}{\text{Total production staff}}$$

the following figures were obtained for ship construction at the People's Shipyard in 1979:

	Degree of mechanization	Degree of automation
Total production staff in the area of shipbuilding	0.605	0.068
Manufacturing operations in the area of production	0.626	0.187
Assembly operations in the area of production	0.600	0.040

1.2 Positioning Sections

As in the construction of large steel containers, special considerations in the assembly procedure for ships result from

—the structurally determined method of joining (in this case fusion welding) and
--the large dimensions and heavy weight of the components and sections.

Studies by Begler and Beyrodt [3] revealed the following:

1. The assembly operation in the strict sense consists of four suboperations, named for their functions. They are:

--Preparation
--Locating (positioning) and the making of a temporary join
--Making of the final join and
--Finishing

2. The very heart of the assembly operation is positioning and making the final join.

The temporary join is made by suitably securing the components in position. Locating a component whose place is set by the design--in this case a section--is described as positioning. The section must be identified and moved. For this, test procedures are required.

During manufacture more or less serious deviations from the prescribed size and shape can occur in geometric qualities. These deviations are frequently so large in ship hull construction that positioning operations must be interrupted by alignment operations. This situation is determined both by the accuracy achieved during manufacture and by accuracy in positioning. An added difficulty in ship hull construction is that, independently of the degree of precision achieved during manufacture of the component, its geometric qualities change during assembly. According to Lerche and Rogge [4], the time spent in making adjustments is 35 percent of the time spent in assembling a ship, and according to Adlersteijn 5 up to 40 percent. In addition, it cannot be assumed that only the n^{th} plus 1 component is affected by discrepancies in shape and position. The n^{th} component shows deviations from the specified geometric shape.

1.3. The Previous State of Methods for Measuring Position

Methods for measurement employed previously have as their first step in the start of assembly the drawing of a straight line for a main base line; it is drawn on the shed or berth floor and preferably indicates the ship's center line. The first sections are positioned according to this base line, and the temporary or final join is made. Using a mechanical or optical plumb line, leveling instruments and geodetic instruments, the base line is transferred to the assembled bottom sections. From this auxiliary base line, straight lines, right angles and normal planes are set up, with whose help additional sections are positioned as required, forward or aft along the length of the ship. As Knoth [6] and Knoth and Lange [7] discovered, these methods of measuring and assembly suffer from serious defects:

--The datum points and reference systems used are not applied consistently and uniformly in the pre- and final assembly. Discrepancies existing in construction are not caught until final assembly and must be compensated for then.

--The principle of compensating in the contiguous plane of joins necessarily leads to distortions in the free planes and thus to new fitting problems.

--The dimensional reference systems now in use have to be regarded as object-dependent, particularly as the state of assembly of the ship's hull progresses; that is, the systems of referencing contain positional errors from divergences in the shape and position of the already assembled sections.

2. An Object-independent Dimensional Reference System Using Laser Alignment Technology

2.1. The Problem

The following technical-technological problem resulted from the concluding statements made in 1.3:

--A consistently object-independent dimensional reference system for ship hull assembly must be created;

--the technical accuracy required and permanent consistency must be guaranteed;

--permanent measurability and simple, labor-saving operation must be assured;

--regulations concerning health and work safety and fire protection must be observed;

--money used for investment must show a steady economically based return from the savings.

2.2 The Technology of Equipment and Apparatus

Basic Construction of the Measuring Stand

Preliminary studies, conducted jointly by members of the parent enterprise of the VEB shipbuilding combine and the technological research department of the shipyard and also involving production workers in ship hull assembly, led to the development of a stationary dimensional reference system with rigidly located instruments. The system was tailored to the requirements of large-scale production of the "Atlantic Supertrawler" type of ship, and transferability to other product lines was planned in. Ship hull assembly was actually projected into a "rigid measuring stand." The dimensions of the ship hull's systems (center line, B/2, position of transverse joints or ribs, the position of longitudinal joints or waterlines) were created by straight lines which incorporate the lines joining specially located reference plates in the shed floor, the shed walls and in the stationary equipment. The reference plates serve simultaneously for location and for checking position. To suit the special technology used at the People's Shipyard in Stralsund (assembly of ship hulls on keel blocks and consequently a built-over center line), two main base lines--each above the height of the tank deck to port and starboard outside the ship's hull--were set up. Auxiliary lines were drawn parallel to them above the top through deck.

Laser Beam Generator

The measuring system was designed and built on the basis of laser sighting technology because of its visibility, constant measurability and acceptably high accuracy. The core comprises a He-Ne [helium-neon] laser, manufactured in the GDR, with these principal technical data:

Type of laser	Continuous operation
Nominal output	5 mW
Output at the lens	3 mW
Power consumption	120 W
Wavelength of the emitted laser beam	632 nm
Weight of the laser	150 N
Weight of the power supply	200 N

One unit is located on each side of the ship on a vibration-free support. The instruments are mounted on adjustable and lockable units and protected against falling parts by safety covers.

Collimating Marks

Passive and/or active collimating marks are located on a separate, vibration-free collimating mark support at a precise target to locate the position of the beam from the main and auxiliary base lines. The active collimating marks, a joint development of the academy for architecture in the GDR (Institute for Technology) and the People's Shipyard in Stralsund, provide positional information by comparing the currents of the photoelectric effect of four-quadrant diodes. A large-screen display signals any deviations in position. The laser beam is automatically shut down by a mechanical beam deflector, if the preset tolerance for the position of the beam is exceeded. Thus, operating with an out-of-adjustment base line is eliminated. At present the preset beam tolerance at the People's Shipyard in Stralsund is ± 2.0 mm on a base length of about 100 ms.

Optical Beam Splitter

A beam splitter (Penta-Prism) is located directly behind the point of emergence of the beam. The main beam is split, and a partial beam deflected vertically at 90° is again bent through 90° at the height of the top through deck, using a second prism, to act as an auxiliary base line parallel to the main line, limited by an incident light target.

Rotating Rib Unit

This is a pentagon prism, which can be rotated through 360° and can be mounted on a stand at any point desired on the main or auxiliary base lines. After it has been aligned with the aid of incident light targets and built-in, adjusted inclinometers, the laser beam deflected at 90° describes a normal plane to the base line beam as the rib prism is rotated and can be measured.

Rotating Waterline Unit

In the system of the People's Shipyard at Stralsund, the stationary optical unit located in the vertical beam path behind the beam splitter generates the required secondary base line for height and lateral reference on the ship's sides. It can also be swung above the deck and measured as a height reference.

Optical Rotating Wedge

Optical rotating wedges can be introduced to raise the main and secondary base line beams in the region of the forecastle and poop. The uncertainty of the rib and waterline normal planes is 90° ± 0.05 mm/m . With the dimensional relationships of ships' beams and the location of the laser beams (<20 ms interval), the locational uncertainty of dimensional references has been improved enormously, compared with former practice.

Stationary Equipment Support

In the VEB People's Shipyard at Stralsund, precisely measured equipment supports, in the form of the 60 Tripod, were built into the ship's fittings along the main and secondary base lines in the area of high volume joins. When these supports are not in use they are protected by specially developed hoods made of fiberglass reinforced polyester resin.

2.3. Practical Work with the Positioning System

In the assembly sheds of the People's Shipyard about 80 percent of all sections can be positioned completely or to the extent required in selected degrees of freedom using laser technology. The laser equipment is brought up and, if necessary, the main and secondary lines are adjusted by workers from the measuring collective. The main base lines can be set by one person as the laser is brought up and in the case of misadjustment using electronic collimating marks. Positioning operations are carried out by the shipbuilders themselves, by direct measurement of the normal base lines, rib lines or waterlines. In product-related measuring technologies the true measurements and the operations to achieve true positions are prescribed. The actual measurements are read off using a scale by measuring the laser beam. These measurements are taken only in the range between 400 and 600 ms. Special distance patterns make it easier to recognize a simple approximation of the actual positions to the true positions.

After the suiable technical-technological feasibility and the economic effect had been examined in preliminary studies

--a basic decision about investment,

--operating instructions for individual pieces of equipment (new developments in part) and the entire system,

--product related measuring technologies,

--proof of health, work and fire protection,

--information about work protection for users,

--instructional programs for training users and

--documentation for scientific-technical legal protection

still had to be worked up in the preparatory phase. These tasks--as well as finding investment funds--were undertaken jointly by production workers in ship construction, engineers from the People's Shipyard at Stralsund and the KSR parent enterprise, with support from the academy of architecture of the GDR--Institute for Technology--and the Wilhelm Pieck University in Rostock.

3. Experience after Lengthy Continuous Operation

Valuable experience was gathered in more than one year of continuous operation concerning laser technology in an object-independent dimensional reference system. A general estimate is that laser technology has proved itself for its intended purpose and in the scope of its application. The planned savings in human labor were achieved, which guarantees the economic return of investment funds over a period of about 2 years.

The accuracy of the whole system and of its elements was confirmed in production practice. Deflections of the laser beams for the principal base lines by neighboring magnetic fields or turbulence in the nearby surrounding air did not exert sufficient influence in the conditions of the People's Shipyard to cause the beam position tolerance to be exceeded.

Before continuous operation was started, all the workers in the appropriate production section were given a preventive opthalmological examination. Dispensary care of these workers over the period of a year showed no eye damage from laser beams. In the frequent courses on job safety, the workers' attention is repeatedly drawn to the hazards of looking directly into the laser beam or from reflected beams with unprotected eyes.

Except for the laser equipment proper, there have been no stoppages or breakdowns in continuous use since the start of operations in October 1979. The entire system meets the requirements of the shipyard. The useful life of the laser tubes, on the other hand, is not up to expectations. Further technical development concerning reliable flash behavior and a guarantee of the projected working life of laser tubes in this output range are urgently needed.

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9581
CSO: 2302/12

FIRST DATA BANK FOR INDUSTRIAL ROBOTS ESTABLISHED

Center in Karl-Marx-Stadt

East Berlin NEUES DEUTSCHLAND in German 28 Sep 81 p 3

[Interview with Manfred Horner, Karl-Marx-Stadt Research Center for Machine Tool Construction, by Hans Kaemmerer; date and place not given: "First Data Bank Offers Information on Robots"]

[Text] [Question] The research center began offering a new type of service in September, 1981. How does the Data Bank for Industrial Robot Technology founded by you work?

[Answer] In this data bank, experiences in the development, production and application of industrial robots--the entire available knowledge covering the national and international state of development--are collected, stored and distributed. With it, we will help factories fulfill the resolutions formulated for this field at the 10th SED meeting and by the GDR Ministerial Council.

[Question] What are the sources of the bank's data?

[Answer] The Central Institute for Information and Documentation (ZIID) tracks international developments in this field and we store all such information concerning new developments. Developers, producers and users of robots in our republic are, in accordance with a central ordinance issued on 25 August, 1981, required to report to us in a systematic way the results achieved in their areas.

[Question] And who can request information?

[Answer] Practically all institutions and industrial firms in the GDR which are involved with robot-technology tasks.

[Question] What are the advantages of the data bank?

[Answer] First, it guarantees a quick overview of the latest knowledge in the development, production and application of industrial robot technology--and that for many users of our data bank simultaneously.

Second, we propagate information which is useful in shortening the groundwork for management decisions and which supports in a significant way the optimization of our own objectives and methods of solution.

Third, and finally, our concrete facts support the exchange of experience. They accelerate the use of available solutions and help to avoid duplication of effort.

As already said, we are just beginning. We are looking forward to a successful cooperative effort with all members of the data bank.

Legal Order on Responsibilities

East Berlin GESETZBLATT DER DEUTSCHEN DEMOKRATISCHEN REPUBLIK in German Part I No 27, 15 Sep 81 pp 334-336

[Official text of "Order of 25 August 1981 on the Establishment and Organization of a Data Bank for Industrial Robot Technology," signed by Dr Georgi, minister for construction of machine tools and processing machinery, East Berlin, 25 August 1981]

[Text] For the accelerated development and use of industrial robot technology, the following, in agreement with the directors of the responsible central governmental agencies, is ordered:

Article 1--Area of Application

1) This ordinance holds for all combines, factories and institutions which develop and/or produce and/or use industrial robot technology.

2) Industrial robots, including peripheral equipment (hereafter called industrial robot technology), are in the sense of this ordinance independent or machine- or equipment-integrated automated or automatic devices for specified movement and manipulation of parts and tools for the purpose of systemizing main and auxiliary processes.*

Article 2--Basic Provisions

1) The data bank for industrial robot technology (databank) serves the collection, storing and transmitting of knowledge and experience relating the national and international state of development, production and application of industrial robot technology.

2) The data bank is to be established in the research center of the Machine Tool Factory Karl-Marx-City (FZW), a component of the Fritz Heckert VEB Machine-Tool Combine, and is to be developed to provide information for the combines, factories and institutions of the GDR.

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*See the National Bureau of Statistics Instruction of May 1981 concerning the use of industrial robots.

3) In the data bank, information is to be stored and made available to users covering:

--the international level of development, production and application of industrial robot technology;

--industrial robot technology previously developed or being developed in the GDR;

--the total of industrial robot technology developed in the GDR; and,

--all cases of industrial robot technology application in the GDR (including technical parameters and economic results) irrespective of whether the technology was developed in the GDR.

Article 3--Duties of the FZW

1) The FZW has the task of organizing and effecting the establishment and continuous operation of the data bank with the objective of propagating knowledge and experience relating to the national and international state of development in industrial robot technology.

2) The FZW has the tasks of conducting research studies in the data bank, distributing information and providing sources based on information requests from the combines, factories and institutions.

3) The FZW has the tasks of organizing the information flow between the combines, factories and institutions, of establishing the form of data bank evaluations and of developing the documentation forms for "Standard Report on the Development, Production, and Application of Industrial Robot Technology" and "Information Orders." The required methodology and organization shall be structured and coordinated with the existing reporting system in such a way that the work can be accomplished with the least additional expense.

Article 4--Duties of the Central Institute for Information and Documentation (ZIID)

1) The ZIID has the task of acquiring and making available to the FZW in evaluatable form information relating to the scientific-technical and economic content of international industrial robot technology based on prescribed information profiles and source types.

2) The ZIID has the task of compiling the acquired information in the form of publications and other information media and of ensuring the availability of such material.

3) The information described in Para 1 relating to industrial robot technology is to be made available to the FZW, management and coordination centers and interested factories and institutions. The ZIID shall coordinate the distribution to the affected disciplines.

Article 5--Duties of the Combines, Factories and Institutions

1) Before starting development, production or application of industrial robot technology, the combines, factories and institutions are obligated to inform themselves about analogous development, production or application cases through use of the data bank and shall demonstrate the results on an evaluation sheet.

2) The combines, factories and institutions are obligated to prepare and transmit to the FZW via standard report forms the information required for the establishment and continuous operation of the data bank, particularly information derived from:

--development tasks, with confirmation of the evaluation sheet;

--production startup (including special fabrications and tooling); and,

--initial application of industrial robot technology.

3) The combines, factories and institutions which develop, produce or use industrial robot technology of a particular type shall provide consultation services upon request. They shall ensure reuse of documentation.

Article 6--Method of Operation

1) The method of operation and the instructions for the overall operation of the data bank are specified. The regulations pertaining to the publication of scientific-technical information and the protection of secrets shall be observed.

2) The documents "Standard Report on the Development, Production and Application of Industrial Robot Technology" and "Information Orders" are to be procured from the FZW.

3) Upon delivery of documents, the FZW shall provide instructions and forms to be executed.

4) The standard reports received by FZW shall be collected, classified (marked with machine-readable data codes) and stored in the data bank.

5) On the basis of information requests from combines, factories and institutions, research studies in the data bank shall be carried out and the results sent to the requestors.

6) The report on research results shall contain the following:

- Relating to industrial-robot-technology applications;

--type of application and tasks;

--brief technical description of application and producer;

--information on related and reuse possibilities and available documentation; and,

--economic information such as the number of freed workers and cost of realizing the application;

- Relating to industrial robot types

--developer and producer;

--technical description with short list of characteristics;

--technical and economic parameters (load rating, motion possibilities/degrees of freedom, working speed, drive and control type, type of programing, space requirement, weight, etc.);

--projected main areas of application; and,

--date of availability and delivery possibilities.

Article 7--Pricing Policy

The research studies for the factories will be charged to the customers in accordance with the current legal pricing criteria.

Article 8--Effectivity

This ordinance shall be effective upon publication.

9160
CSO: 2302/11

VIEWS ON REORGANIZATION OF RESEARCH INSTITUTES AIRED

Budapest MAGYAR HIRLAP in Hungarian 30 Sep, 1, 2 Oct 81

[Article by Ilona Kocsi: "Research Diagnosis"]

[30 Sep 81 p 7]

[Text] The "society" of researchers and developers has been thrown into a fever: the reorganization of the research institutes--although it has just begun--has found a great response everywhere. Those affected are still hesitant to make statements, they are taking a waiting position. Elsewhere they are evaluating the changes more readily. How do various people see the research and development situation here at home? What are the chief obstacles to effective work? In our three-part series on the transformation of the research institute network we will be seeking answers to these questions.

"If something doesn't work here it gets reorganized," burst out a research institute worker recently. "It is as if the quality and effectiveness of work depended only on the organization and not on the economic environment, more concretely on the regulators. Well, it is easier to reorganize an institute than the entire economy, to change the methods of work which have developed...," he continued. In any case this opinion shows that the plan of the Science Policy Committee (TPB) for a comprehensive reorganization of research institutes has not aroused, understandably, uniform enthusiasm among those affected. It would be naive to believe that even now, after the reorganization was confirmed by a Council of Ministers decree, everything is going like clockwork. Of course, we still have time--in regard to the time limits--because the changes have to take place by the end of 1983....

What justified the reorganization affecting the entire research institute network? Until recently there were 123 institutes in Hungary which bore the distinguishing modifier "research" which, in addition to sounding nice, ensured certain advantages to them. For example, modern instruments could be imported for such places duty free; the amortization regulations were favorable; researchers were guaranteed pay raises every 3 years; they got special leave; and up to last year they could engage in production free of taxes. In the ranking of professions social judgment gives an outstanding place to scientific researcher. Even researchers working at enterprises share in the latter; they share a good bit less in the former. It is no accident that the independent research institutes siphon off the best manpower from here....

Privilege and Performance

All these advantages, of course, do not in themselves justify the changes. If, however, the performance is not proportional to the privileges--and this is now the opinion about the research institutes--then there is trouble. The alarming figures are well known, but it will do no harm to repeat them. Between 1969 and 1978 research institute personnel increased from 26,000 to almost 36,000. At the same time the innovations coming from the institutes and used in practice come to only a few percent of all the new products introduced. In other words, there are not many signs in the results that the chief task of the independent organizations is research and development. As an answer to this it is frequently said that the researchers are not interested in practical introduction; they are interested in publication and in getting scientific degrees because this is how they go up the ladder. This is why it is shocking that the TPB found that between 1967 and 1978 the ratio of those with scientific degrees among institute researchers decreased from 14.4 percent to 11.3 percent. No practical results and no scientific results?! This makes one think. What are the researchers doing?

They are not idle, let us make that point immediately. They fill their work time; their strength is occupied by that activity which they perform largely on the basis of enterprise commissions. For example, they manufacture ad hoc or small series instruments and offer computer technology or engineering services--to mention only the most important. According to the surveys the personnel and money used for real research and development in the research institutes does not reach 60 percent of total employment and cost. They use 23 percent of the money for production, 9 percent for services and the remaining 10 percent for other activities--collecting data, organization, classifying. In more than 20 places research and development does not make up even half of the institute work. The question is whether such work should be the task of a research institute. If so, what ratio can one regard as optimal? According to the position taken centrally this should not be the task of researchers--even though the services involved are essential from the viewpoint of the economy....

New Forms

It is certain that these curiosities led to the present reorganization, as a result of which more than 40 of the 123 institutes will function in a different management system. For example, as a developmental enterprise which will undertake practical introduction of innovations also. They will deal with research, development and manufacture, and so can realize their own developments. In the future a number of research institutes will become branch institutes; that is, they will be run and financed by several enterprises and will work on the basis of their orders. There will be "frame institutes" where they will specialize on some more comprehensive theme and in addition to their permanent staff they will employ other researchers temporarily, in accordance with the goal.

A year has passed since this reorganization was decided upon; it has been over half a year since those interested learned of it. The first ideas and action programs were prepared in June. Those affected decided what a new form they considered salutary. The ministries gave their opinion of the selection and took a position regarding the time and method of the conversion. All this has been done in such a way that one can expect regulations for the new institutes and enterprises only at the end of the year. Can they decide without knowing the rules? An old solution. According to an opinion voiced in the Ministry of Industry drastic intervention may be more salutary than prolonged preparation. According to an opinion voiced in the Ministry of Industry drastic intervention may be more salutary than prolonged preparation. According to others the developmental goals and research tasks will be the orienting factors this way. The selection can be made not according to how one can prosper best but rather according to which institutional or enterprise form can produce the best results. This theoretical consideration is certainly true; but decisions of a different character occur in practice also.

Some of the research institutes chose that which is most similar to their present position and work. For example, they chose the developmental enterprise form because in this way they can remain independent--and this is an important viewpoint everywhere--and because they hope to retain certain advantages in the future also. In this solution they cannot be blamed because research will be forced into the background in comparison with manufacture or services. Indeed, it is the express advantage of the developmental enterprise that innovations will be put into practice quickly, if they begin manufacture.

Uncertainty

There are still question marks. It is not only that the lack of regulators makes those affected uncertain, there have also been changes in the period since the study. For example, the Pharmaceutical Industry Research institute would be the institute of several enterprises according to the original plans, which would mean that it would have to satisfy enterprise requirements with its research. It is questionable whether the stressed program for pharmaceuticals, crop protection materials and intermediary manufacture could be fulfilled in such an organizational form. There are many arguments pro and con.

The goal of the changes is clear. But it is not clear how the institutes can be encouraged toward the practical introduction of results. Will the enterprises accept the innovations happily in the future? For the time being the spheres of interest and the motives of the new style of thinking and acting are obscure. Incentives and interest are lacking everywhere--as we will see in our next two articles. At present industry wants one thing and the researchers want another. The needs and ideas only rarely coincide. "Why should it be this way?" one of my conversation partners asked with apparent cynicism. "Few today are paid according to how many useful results they produce. If one could live this way why would one work differently? The appropriate interest exists wverywhere; everyone is acting rationally." Really?!...

[1 Oct 81 p 7]

[Text] Few innovations reach the enterprises from the research institutes. But neither are too many outstanding results achieved in scientific work. In a strange way they deal more with production, the manufacture of ad hoc instruments and providing various services. Why? Can one not live from research? Or do they simply choose the easier way to make money? At the research institutes they say that much more prosaic causes lurk in the background.

"Let us take the example of the Signal Technology Research Institute HIKI)," Ferenc Banyai, business director, began the conversation. "It frequently happens that products have to be put out for 5-6 years with the HIKI emblem. Do not believe that we are selfish and do not want to hand over manufacture. There simply is no one to hand it over to. So experimental manufacture grows into a series of several thousand. We deal primarily with microelectronics--not basic research, but adaptation, following the leading technology from a certain distance. So we are not divorced from life, do not want to force an absolute 'tip-top product' on industry. But without electronics many branches of the machine industry 'cannot hack it,' at least not abroad. Still, many enterprises would be able to take over manufacture only if we loaned them the researchers too. We cannot do this. But we do undertake to train the experts.

"Is experimental manufacture a losing proposition? On the contrary. It is one of our most profitable areas. It is true that it detracts from development. We are not forced to start over every few years, to abandon the old. We are becoming a factory against our will. And we are not doing so well with our own tasks. We deal with an awful lot of things--we manufacture semiconductors and the special machines needed for this, hybrid and printed circuits, liquid crystal displays, automatic meters and who knows what else. If something is lacking for research we deal with that. One cannot import everything.

"All this could be at the expense of research? We know that but we have no choice. We did not start manufacture of the machines needed for the semiconductors just to amuse ourselves. No one else manufactures them in Hungary. Semiconductors are needed so the machines are too. We do experimental manufacture on enterprise orders...."

Struggle for Introduction

Laszlo Pecsok, director of the Instruments Industry Research Institute, offers similar opinions:

"Ninety percent of the income of the institute comes from enterprise orders. We have a number of instruments which we developed and manufacture ourselves, instruments which significantly raise the technical level of the user enterprise. We have developed products which got on the embargo list also. The problem is that the preparedness of those working in production is not sufficient for manufacture of really new products. The technological level holds them back also. Not even to speak of incentive. Researchers have a basic internal need to create new things and see them realized. The present material incentive system hardly encourages this. And if they find that the enterprises are not happy about new things, that one must fight to start manufacture, they can easily give up the struggle. Let me give a concrete case. A large enterprise used an invention of our researchers in one of its products, manufactured and expected more than 300 complete systems too. But it did not want to pay the inventor's fee. This has happened other times too. The more new ideas we use in an instrument the more disputes there are.

"Despite this I admit that our researchers should turn greater care to see that their designs better fit the technical level of the enterprise. But do not believe that the enterprises are always ready to help us and keep us informed....The profitability of a new product must be created on the 'drawing board,' and among other things this depends on us. A poorly prepared design can hardly be made economical later in production. This is why they specify what design method must be used in the West. Of course--here we return to Hungarian reality--it is another question whether our engineers can think like economists. We do not teach this method here yet. But what we develop should not cost more than the corresponding western product."

Accommodation

"As for industry--although I do not want to be constantly making an example of them --the variety of parts should be narrowed. The Hungarian electronics industry now works with about 50,000 types of parts while Siemens, for example, works with only 20,000. I feel that the economist's way of thinking has not conquered industry completely either...."

So the research institutes have accommodated and they are producing in addition to (or in place of) doing research. This is to say--in their opinion--that there can be no talk of their having broken with reality. This is true. But for the most part the institutes get their commissions from the "softest" enterprise money, from the technical development fund (MUFA). This is the money which the enterprises can use in only a very narrow sphere and so, lacking anything better, they frequently entrust an institute with some task. So the enterprise orders are not such a great merit....

"It always surprises me to hear this," answers Ferenc Banyai a little hotly. "Primarily if one says now, when every sort of money is becoming hard, that it is because there is so little of it. It is true that in the past it was easiest to get money under the title of technical development. If it was not all used up at the end of the year the chief authority would talk to one or two enterprises and institutes and all one had to do was find a pretext. But this is really a thing of the past. Today technical development is a vital question for the enterprise. And if the MUFA is wasted, given as a present to a research institute, you will have to think about it a few years later. Only a leader who does not understand, who has a narrow horizon, could call this money 'soft' today."

Surrender

Of the two institutes questioned the reorganization affects only the instrument industry. The HIKI--according to my conversation partner--will remain--for the time being--a research institute.

"I had a lot of agruments before the decision," confessed director Laszlo Pecsok. "I argued that our institute should retain its present form. It turned out that the committee making the survey and our chief authority at the time were of this opinion also. And then came the news about the reorganization. So I 'surrendered' and now take the position that we should become a developmental enterprise in a short time, without a hitch. I do not think that this will mean a fundamental change as compared to our present work."

So, finally, it is understandable if an institute condemned to reorganization is not enthusiastic about the changes if it takes criticism badly. But it is less understandable, and it is unacceptable, if the basic activity, research, is forced into the background in the institutes, if a worker there tries to get a product introduced only because of conscience and not because he has a fundamental interest in it. But is the picture really so dark? Are the enterprises really so unaccommodating to the introduction of new products?! In tomorrow's article the enterprise experts will have their say.

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[Text] The enterprises are not always able to make use of research achievements. So the research institutes are forced to engage in manufacture as well. Is this really all that is involved? Or has research divorced itself in large measure from domestic reality? Perhaps there are other problems in the background....

"We never hand over the development of mass items to the research institutes," Istvan Bodor, technical director of the MMG [Measuring Instruments Factory] Automatics Works, stated definite[illegible] "Although I admit that well prepared experts work there also. But they do n[illegible]ow the technology and conditions of our factory. They idealize the task, they want to make the best. Only they do not consider whether the recommended material can be obtained, whether we are capable of the manufacture, and if so how much. So it happens that we get the plans, and begin to rework them for the given manufacturing conditions.

"Do the research institutes come here to study and analyze the local scene? There has been no example of this so far. So we use outside researchers primarily for the instruments in large pieces of equipment. Here many types of instruments must be developed, modernized and incorporated into a system; we cannot do all this ourselves...."

Backwardness

"As for a readiness for adaptation," we are now speaking with Karoly Molnar, developmental chief engineer for the Hungarian Optical Works (MOM), "we really are backward here. But why? And this is interesting, it is not just a statement of fact. Because we do not have enough technical experts; the really talented ones want to get into a research institute. The 'gray matter' slowly leaves industry. This is not to be wondered at, but something must be done to prevent it. An enterprise engineer has much greater responsibility, he lives in a constant scramble, he must follow the products as they are introduced also. He frequently gets into a stress situation. And all this for trifling money. Here, at an enterprise with almost 8,000 employees, an engineer with 8-10 years experience makes 4,500-5,000 forints. At the same time, he sees that a good skilled worker leaves him behind.after 2-3 years. Of course, money is not everything, but one must live on something. They advertised a supplementary admissions program at the Miskolc Heavy Industry University this year. This also is a consequence of a distortion of social value judgment. A research institute worker still has some prestige. I do not say that he earns more there, but he has greater freedom and less responsibility. And he has more time to study the technical literature.

"Yes, I have heard about the personnel stop. But that will not produce sure developmental engineers here. They will go to their careers where one can reach the goal with easier, more flashy work. Those will remain here who take development to heart. I do not seek the problems in the organization but rather in how interest is perceived and presented. So that the institute should be interested not only in research but also in realization. So that the researcher will come to the enterprise and work on introduction. He should feel that he should help 'his child' into the world. We should pay well for this work, this knowledge. When manufacture is on track then the researcher can continue his work at his original job. We need not talk about the bad adaptation readiness of industry when recommending such a practice. Because an adaptation readiness does exist."

One of the interesting features of the organizational changes will be the creation of frame institutes where researchers working in various institutions will form work groups for the solution of some special task. Everyone will maintain his status at his original place of work, but for a while he will transfer to another institute. If this movement could be realized between research institute and enterprise or between university and enterprise.... But for the time being this is only a nice idea. "And yet," emphasized Dr Janos Prohaszka, director of the Mechanical Technology and Material Tectonics Institute of the Technical University, "the movement would bring some life to research work too."

Movement is Lacking

"At the Technical University we sign a time limit contract with the young workers (as is done in every research institute and university). When the contracts expire they are renewed in the great majority of cases. So the time limit does not have too much significance....

"So we hardly have any free positions for years. They are not inclined to leave us so no new workers can come. In the past 10 years a total of two positions out of 12 have been vacated. Is this our fault? It is a fact, but the social atmosphere does not favor movement; discharging someone or not renewing his contract is regarded as antihuman. So our workers are not drawn to the enterprises. Despite the innumerable advantages of the research institutes they are not so attractive that people want to leave us to go there. The selection of themes is more free for us than elsewhere. Working with the students brings many advantages, even in research tasks. And the university has a two month summer vacation, the work time is not fixed and the relatively low income can be supplemented by the so-called KK [outside the budget] work. But a renewal would be very important in our area too...."

There Must Be Incentive

"And research results really are achieved. For example, a metal worker at Csepel patented an air cushioned grinding machine--it is not manufactured here but it is in western Europe. The spark metal cutter won a grand prize at the Brussels exhibit. It is manufactured in many places, but not in Hungary. We lack, they say, the economical series size.

"We cooperate with the research institutes, we can use their more modern instruments and equipment. But this aid is thanks to personal rather than to institutional contacts. This is also true of the introduction of research. Good ideas get lost simply because there is no automatically developed system of contacts which, ultimately, would serve the interests of the people's economy also. In capitalism profit is the motive force; we have not yet found ours. I am afraid of administrarive measures; there have been too many bad experiences. In addition to incentive one should not forget about value relationships. Because today a person works outstandingly in vain, if it cannot be rewarded. Such wage payment has slowly eliminated the difference between the good and the bad. I feel that if we could set to rights interest and the value system then there would be an automatism which would encourage both researcher and manufacturer to introduce the research results...."

Thus far we have had opinions, frequently contradicting one another. But what we have heard surely proves that research and development is ripe for changes, that action must be taken as soon as possible. One possibility is organizational change, the development of new forms. Something else is needed for more lasting results--at least what we have heard suggests this. What is needed is the mutual interest of researchers and producers and a setting to rights of the distorted value system. Without this it may happen that in the future it will be not only the university in Miskolc which must advertise a supplementary admissions program because of too few applicants.... And this could have incalculable consequences not only in research but in the entire economy.

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BRIEFS

COMPUTERIZED PATENT, LICENSE LISTING--To make latest technical information available to the enterprises, computerized listing of patents is to be established in Hungary. For the past 5 years, we have been receiving patent data of 48 countries from the USSR. Beginning in 1982, this computerized information service will be available to our enterprises. The purpose is to arouse enterprise interest in and accelerate purchase and sales of patents and licenses. [Budapest NEPSZABADSAG in Hungarian 28 Oct 81 p 1]

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